

GT SERIES

WET PRIME PUMPS

GT SERIES WET PRIME PUMPS OWNER'S MANUAL



GT SERIES WET PRIME PUMPS

BEFORE GETTING STARTED

This manual provides installation, operation, and maintenance instructions for your Pioneer pump and is intended to make your personnel aware of any procedure that requires special attention because of potential hazards to personnel or equipment. Read all instructions carefully and remember, pump installations are seldom identical. Centrifugal pumps are designed for specific service and may or may not be suited for any other service without loss of performance or potential damage to equipment or personnel. Therefore, this manual cannot possibly provide detailed instructions and precautions for each specific application. Thus, it is the owner's/installer's responsibility to ensure that applications not addressed in this manual are performed only after establishing that neither operator safety nor pump integrity are compromised by the installation. If there is ever any doubt about suitability for a specific application, contact Pioneer Pump or your Pioneer Pump distributor for assistance.

⚠ WARNING Before attempting to service or maintain the pump, read this manual carefully. Operators and maintenance personnel should have a good understanding of all aspects of the pump and pumping conditions. Failure of operating personnel to be familiar with all aspects of pump operation outlined in this manual could contribute to equipment damage, bodily injury, or possible death.

⚠ CAUTION When servicing your pump, be sure to use only genuine Pioneer Pump parts. These parts are designed to give you the longest wear life and the performance the pump was designed to achieve. Pioneer Pump has your safety in mind when designing the parts used in the pump. If you decide to use other brands of parts in your pump, operating safety could be compromised and the warranty will be void.

⚠ WARNING The GT Series pumps are designed to handle mild industrial corrosives, residues, and light slurries containing large solids. Do not attempt to pump volatile, corrosive, or flammable materials that may damage the pump or endanger personnel as a result of pump failure. If the pump is used to handle any hazardous materials that can cause illness, either directly or indirectly, take precautions by wearing appropriate Personal Protective Equipment (PPE) when working around the pump and use appropriate safety equipment.

⚠ WARNING Do not operate the pump against a closed discharge valve for long periods of time. If the pump is operated against a closed discharge valve, the liquid inside the pump will become heated, build steam pressure, and possibly cause the pump casing to rupture or explode. If the pump is overheated, do not remove plates, covers, gauges, pipe plugs, or fittings from the pump. Vapor pressure from within the pump can cause the removed parts to be ejected with great force. Allow the pump to cool before servicing.

⚠ WARNING Remove suction and discharge piping before moving or lifting the pump. Any lifting equipment should be appropriately rated for the weight of the item being lifted. Use appropriate lifting methods and equipment. If chains, cables, or slings are wrapped around the pump for lifting, make certain that they are positioned to ensure the load is balanced and so that they do not damage the pump. The lifting bail on trailer- or skid-mounted units is intended for use in lifting the pump package only. Any other items placed on the pump package during a lift could cause the lifting bail to fail and the pump package to fall, possibly causing property damage, personal injury, or death. Suction/discharge hoses and piping must be removed from the pump before lifting.

⚠ WARNING Do not operate the pump without guards in place over the rotating parts. Exposed rotating parts can catch clothing, fingers, or tools, causing severe injury to personnel.

TABLE OF CONTENTS

Before Getting Started	1
Introduction	3
Recording Model and Serial Numbers	3
Pump Installation.....	4
Piping General Setup.....	5
Operating the Pump	6
Troubleshooting Guide	9
Appendices	11
Notes	13

GT SERIES WET PRIME PUMPS

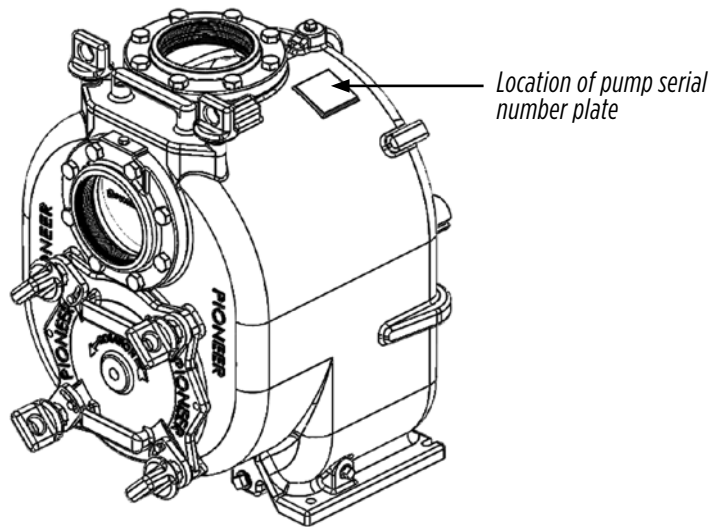
INTRODUCTION

Thank you for purchasing a Pioneer centrifugal pump. We hope that you will enjoy long and satisfactory service from this product. Your safety is our primary concern, so please operate the pump safely, in accordance with the guidelines, cautions, and warnings written in this manual. We wish you safe and productive pumping with your Pioneer pump.

Each Pioneer pump and its associated equipment is inspected at the factory prior to shipment. Pioneer Pump takes particular care in packing to be sure each pump is shipped complete. However, you should inspect the pump and its equipment upon arrival for damage or item shortages based on the packing slip. You should report any damage or shortages to the carrier, as well as Pioneer Pump, within (15) fifteen days of receipt from Pioneer Pump or your Pioneer Pump distributor.

RECORDING MODEL AND SERIAL NUMBERS

The serial number plate of the pump is located on the pump casing as shown in the illustration below.



Please record the model and serial number of your Pioneer pump in the spaces provided below. It will simplify the process of acquiring parts or service from Pioneer Pump.

Pump Model: _____

Pump Serial Number: _____

Engine/Electric Motor Brand and Model: _____

Engine/Electric Motor Serial Number: _____

PUMP INSTALLATION

Pioneer pumps are available in trailer-mounted, skid-mounted, or conventional channel base-mounted configurations. In each case, it is critical that the pump be level during operation.

Mobile Packages

For portable trailer- or skid-mounted configurations and engine-driven units, it is important that the pump set be level to assure proper pump lubrication and operation, and to provide the intended fuel feed and distribution of engine lubricants.

Trailer-Mounted Packages

Trailer-mounted units can be leveled using the tongue jack and blocking under the lower wheel. Wheels should be properly chocked to prevent the trailer from rolling.

Skid-Mounted Packages

Skid-mounted packages should be leveled by preparing a level area on the ground, or by using blocks under the skid.

Channel Base (Fixed Installation) Packages

THE FOUNDATION

A good pump foundation will inhibit vibration, provide a solid base for pump alignment, and allow for the pump to be installed perfectly level.

LOCATION OF THE FOUNDATION

The location of the structure should be as close as possible to the liquid to be pumped. Be sure to allow adequate space for operation, maintenance, and inspection of the pump and equipment during operation. If the pump is to be mounted on a steel frame or similar structure, it should be set directly over the supporting beams. These beams, along with the structure, must be rigid enough to prevent distortion and potential misalignment due to movement within the structure or base.

GROUTING

It is good practice to grout under a base-mounted pump. If grouting is to be done, ensure that the pump package is installed flat and level for correct alignment of the pump and motor.

MOUNTING THE PUMP

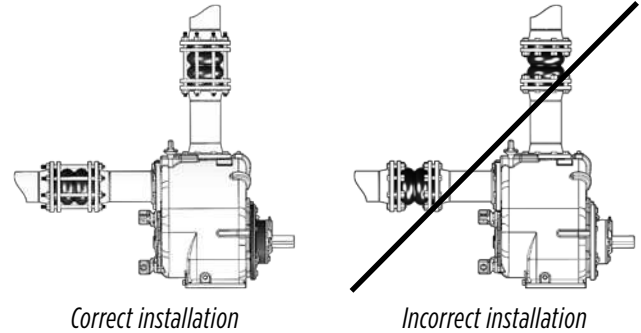
Be sure to remove all shipping protection prior to mounting the pump, and ensure that all foreign material has been removed from the pump and system piping. Be sure the pump is mounted perfectly level, and that the pump and its driver are aligned. Failure to align the pump driver and coupling will cause pump vibration and premature wear or failure of the shaft, bearing, mechanical seal, and couplings. Your Pioneer Pump distributor will be able to help you with pump alignment.

GT SERIES WET PRIME PUMPS

PIPING GENERAL SETUP

Pipe System General Guidelines

All piping must be supported, braced, and lined up square before connection to the pump flanges. In fixed or permanent installations, a flex-pipe coupling is recommended on both the suction and discharge pipes to eliminate any piping strains being transmitted to the pump. When using flexible pipe couplings, the extent of flex must be restrained so no strain is transmitted to the pump flanges when expanding or contracting under pressure. Unrestrained flex pipe couplings can transmit potentially damaging forces to the pump flanges.



Portable installations require support of the discharge and suction piping and hose near the pump to avoid excessive forces being carried by the pump flanges. Supporting the piping or hoses with only the pump flanges can result in:

- Rubbing and wear between the rotating and stationary portions of the pump.
- Possible breakage of the case or brackets.
- Failure of seals or couplings.

Suction Piping General Guidelines

- Suction piping should be selected with a wall thickness sufficient enough to avoid collapsing when the pump is operated.
- If a rubber suction line is used, use reinforced material sufficient enough to avoid collapsing when the pump is operated.
- For best performance, the suction piping should be at least as large as the pump flange, never smaller.
- If an eccentric reducer at the suction flange is required, install it with the straight side up to avoid air pockets.
- All piping must be supported, braced, and lined up square before connecting it to the pump. Installing a flexible fitting between the pump and pipe is recommended on both the suction and discharge lines. However, these flexible fittings should be restrained so that they do not transmit a load to the pump flanges during expansion.

The use of flow-retarding fittings in the suction line is to be avoided. If these fittings are used, they should never be placed closer to the pump suction than four (4) times the pipe diameter. When the source of the liquid being pumped is below the level of the pump, the pump should be at the highest point of the suction piping. Avoid long, level runs of suction piping. If a long run of suction piping cannot be avoided, it is better to slope the suction piping up to the pump suction flange to prevent air pockets.

Try to use a single diameter of suction pipe. If a suction line has a diameter larger than the pump suction flange, it is permissible to use an eccentric reducer as mentioned above. The suction pipe and its fittings should be checked for any foreign material (rocks, bolts, wire, etc.) and any sharp burrs or pipe-joint prominences that could disrupt the flow before completing installation, and before starting the pump for the first time. Suction piping must be designed and sized with the NPSH requirement of the pump in mind. Considerations include site altitude and pumpage temperature, as well as pipe length, size, and type. DO NOT OVERLOOK ENTRANCE LOSSES when calculating the NPSH available. Suction design MUST provide a margin of the NPSH available over the NPSH required of at least two feet.

Suction Pipe Strainer

The pump is designed to be operated without a suction strainer. However, if a suction strainer is required, the open area of the strainer should be equal to at least four (4) times the area of the pipe internal diameter. The screen material should be rigid enough to prevent collapse if it becomes clogged.

PIPING GENERAL SETUP (CONT.)

Sump Design General Guidelines

The submergence of the suction pipe into the liquid should be at least four (4) to five (5) times the pipe diameter. If that is not possible, then a baffle or a floating board should be provided to prevent any vortex action allowing air into the pipe. For best performance, a bell-mouth fitting is recommended. Refer to the Hydraulic Institute handbooks or other hydraulic data books for detailed sump design information.

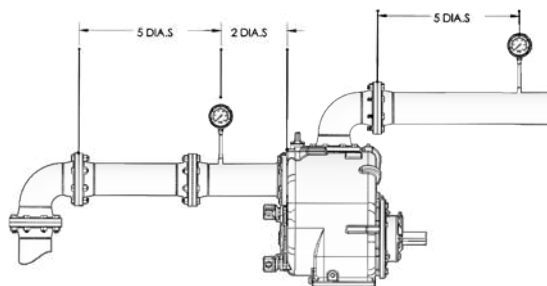
Suction and Discharge Piping General Guidelines

Use a concentric taper on the discharge side to increase the pump discharge flange size to a larger discharge pipe diameter, or maintain discharge piping to the same size as the discharge size of the pump.

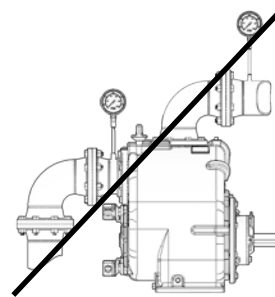
When deciding the size of suction and discharge piping to use, a balance between the higher cost of larger piping compared to the higher energy requirements imposed by friction in the piping should be considered. Additionally, a problem with the size of the piping may be present if the position of the pump condition point is too far left or right on the performance curve. The suction and discharge pipe diameter should be adequate enough to maintain reasonable velocities, and to reduce friction losses. A guideline for flow velocities in the suction and discharge pipe is a maximum of 10 feet (3 meters) per second, and a minimum 3 feet (1 meter) per second. All valves and additional fittings should be the same size as the discharge line.

Pressure and Vacuum Gauges

It is always a good idea to attach vacuum and suction gauges to the pump. The gauges should be placed in the suction and discharge lines in a straight run of pipe between the pump and any valves or fittings. It is recommended to permanently install a ball valve in each position to allow the gauges to be shut off during normal operation of the pump.



Correct installation



Incorrect installation

OPERATING THE PUMP

Rotation

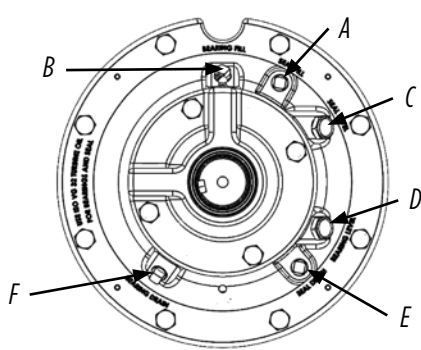
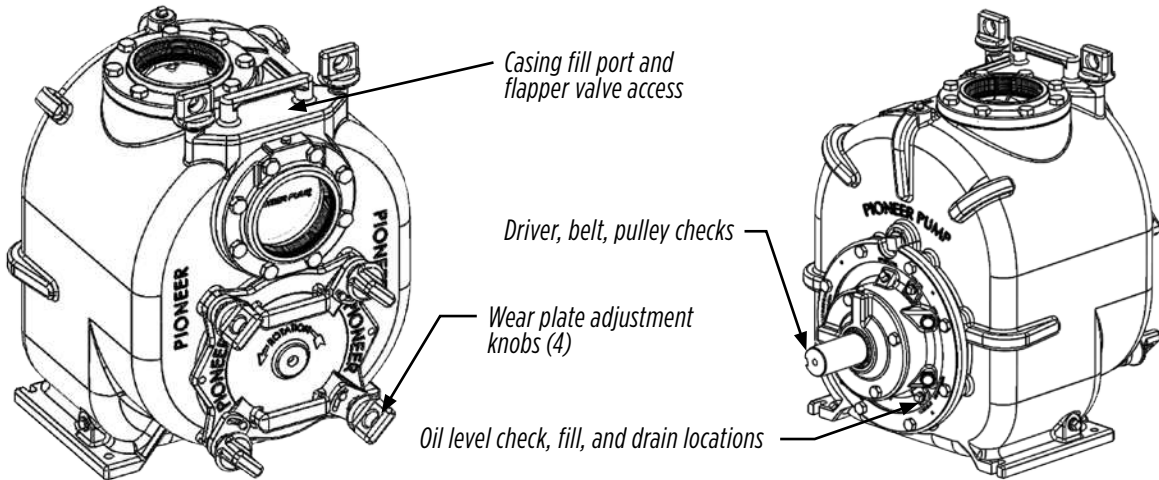
Before the pump is started, the correct rotation must be confirmed. Correct pump rotation is clockwise when viewed from the drive input end of the pump. For a single-phase electric motor, refer to the electric motor wiring diagram. If the pump driver is an engine, rotation should be confirmed with the engine supplier.

For a three-phase electric motor, it is possible that the phases may be incorrectly wired from the factory. Incorrect wiring will cause the motor to rotate opposite to the designed rotation direction. If the rotation direction is incorrect, any two of the power leads should be interchanged.

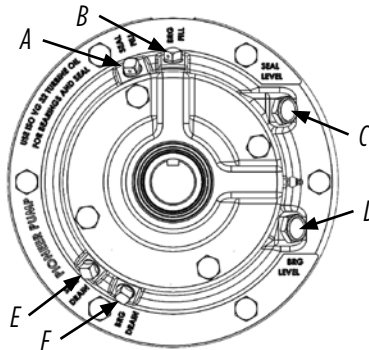
⚠ WARNING Please consult trained personnel for any changes to the electrical system of the pump.

GT SERIES WET PRIME PUMPS

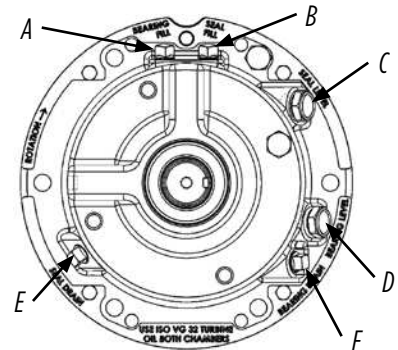
OPERATING THE PUMP (CONT.)



GT6



GT4



GT3

A, B	C, D	E, F
Oil fill port	Sight gauge	Oil drain

Prestart Checklist and Starting the Pump

- Check the seal lubricating oil level. The oil level should be at the center of the sight gauge (C). If there is insufficient oil in the compartment, add ISO Viscosity Grade 32 oil through fill port (A). If there is excessive oil in the compartment, remove oil through drain (E).
- Check the bearing housing oil level. The oil level should be at the center of the sight gauge (D). If there is insufficient oil in the compartment, add ISO Viscosity Grade 32 oil through fill port (B). If there is excessive oil in the compartment, remove oil through drain (F).
- Check all accessible hardware, pipe, and fittings. Check to see that all pipes are correctly supported and secure.
- Ensure that the driver and pump are correctly aligned. Vibration is often caused by poorly-aligned couplings. If misaligned couplings are suspected, contact your Pioneer Pump distributor for assistance.
- Ensure that all belts and pulleys (if used) are in good condition and properly adjusted.
- If the pump is installed using a pillow block or other accessory, follow the manufacturer's instructions for proper inspection, lubrication, and operation.
- Follow instructions on all tags, labels, and decals attached to the equipment.
- Refer to the appropriate manufacturer's manual for engine or electric motor pre-start procedures.
- Ensure that the pump casing is filled with liquid. To fill the pump with liquid, open the pump fill port and fill the pump casing with water. Close and secure the pump fill port, being sure that BOTH fill port O-rings are in place.

OPERATING THE PUMP (CONT.)

Before Starting

- Review all warnings and cautions at the front of this manual.
- For a new pump or installation, and prior to initial startup, ensure that all foreign material has been removed from the pump and system piping. Be sure to remove all shipping protection prior to operation.
- Ensure any discharge valves are fully open.
- Check all suction and discharge piping for leaks.
- Ensure the pump casing is filled with liquid.
- Start the pump. If the pump does not prime within 5 minutes, follow the shutdown procedure and shut the pump down.
- In some cases, especially when a discharge swing check valve is used, a discharge air release valve may be necessary to allow air to exit the discharge area of the pump, and to avoid possible air lock. Pioneer Pump can supply a suitable air release valve if required.
- **⚠ WARNING** Remember, the pump is a self-priming pump, but it should never be operated unless there is liquid in the pump casing.
- Never run the pump with the discharge valve closed for extended periods of time. Never use the suction valve to throttle the flow.
- Do not exceed the pump's maximum operating temperature of 160 °F (71 °C).

Shutting the Pump Down

As it is important to follow a startup procedure when starting the pump, it is equally important to follow a procedure for shutting down the pump. Any abrupt change in pump flow rate could result in water hammer. Water hammer can cause ruptured pipes and damage to the pump components.

For electric motor-driven pumps:

- Do not shut off the pump abruptly. Slowly close the discharge valve, then immediately turn off the motor power supply.
- ⚠ WARNING** Remember, do not continue to operate the pump with the discharge valve closed.

For engine-driven pumps:

- Slowly reduce the engine speed to idle.
- Allow the engine to run at idle for four (4) to five (5) minutes.
- Shut down the engine.
- Turn off the master key switch.

Periodic Maintenance Guide

DAILY

- Verify that rotation is correct and that the shaft rotates freely.
- Check all piping connections, pipe supports, and equipment fasteners for tightness.
- Inspect all accessories and make sure they are appropriate for your installation
- Verify that the driver (engine or electric motor) is aligned correctly and that all guards are in place.
- Check all oil levels. If contaminated, oils should be replaced immediately. Oil contamination is indicated by unusually dark or cloudy oil.
- Follow the instructions on all tags, labels, and decals attached to the equipment.

EVERY 6 MONTHS OR 1000 HOURS

- Adjust drive belt as needed, and check for excessive wear (for belt-drive units only).
- For direct-drive units, check the driver coupling for wear. If wear is noted, it could be an indication that your pump-to-driver connection needs alignment. Your Pioneer Pump distributor can help with pump alignment.
- Adjust the wear plate. See page 11 for the adjustment procedure.

GT SERIES WET PRIME PUMPS

OPERATING THE PUMP (CONT.)

EVERY 12 MONTHS OR 2000 HOURS

- Change all lubricating oils. Oil should be changed in the bearing housing and in the seal reservoir.

Lubrication and Capacities

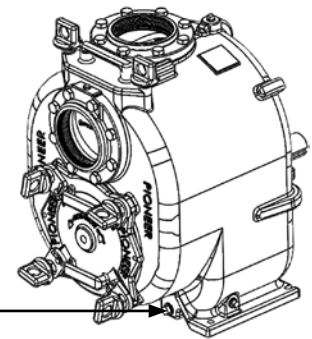
Oil Specification: ISO VG 32 Turbine Oil

COMPARTMENT	CAPACITY (QUARTS/LITERS)		
	GT6	GT4	GT3
Bearing Housing	1.00 / 0.95	0.75 / 0.70	0.75 / 0.70
Seal Reservoir	3.7 / 3.5	2.75 / 2.60	1.50 / 1.40

Extended Pump Storage

If the pump will be stored for more than one month, it is advisable to take note of the following suggestions for extended storage. Drain the pump completely of pumpage to avoid water freezing inside the pump and cracking the case, and to reduce unnecessary corrosion during storage. Since the drain plug(s) may not remove all of the pumpage, it is recommended to additionally remove the inspection cover and blow out the pump with air.

- Store the unit off the ground on blocks so that no water will accumulate around the equipment.
- Protect the pump from blowing sand and dirt.
- Stack no items on top of the pump and pump equipment.
- Protect the pump from entry by animals.
- Every 30 days, rotate the pump shaft by hand to lubricate bearings and seals.
- Protect the pump with drying agents, like silica gel.
- Inspect the unit every 30 days and replace the drying agents (silica gel).
- Keep inspection records showing dates of inspection and condition of the stored pump.
- Use a rust-preventive coating on all bare metal parts.



Case drain plug

When it is time to put the pump back into service:

- Remove all rust-preventive coating.
- Clean the pump thoroughly to remove any foreign material that may have accumulated during storage.
- Remove all drying agents (silica gel).
- Follow the startup guide for the pump.

TROUBLESHOOTING GUIDE

VERY IMPORTANT!!! Before Working Around Any Pump:

- Read and understand the warnings in this manual.
- Shut down and lock out electrical supply (for electrical motors), and disable any auto-start features.
- **⚠ WARNING** If the pump components are hot, allow adequate time for them to cool down before doing any work. Opening a hot pump can result in steam flashing. Disregarding this precaution can lead to serious burns, personal injury, and even death.
- Close suction and discharge valves.
- Vent the pump slowly and drain it completely.
- Be aware that the pump may have been pumping hazardous liquids. Take adequate precautions.
- Ensure that lifting equipment and all tools are adequate and in good working order.

TROUBLESHOOTING GUIDE (CONT.)

It is generally useful to maintain a running record of pump performance as a guide to when routine maintenance should be performed, and to establish pump performance trends as an aid when troubleshooting and rectifying pump problems. The key factors to be recorded in the running record are date, hours of operation, and discharge versus suction pressure. It is always advisable to install suction and discharge gauges on the pump when recording pump performance and when troubleshooting pump problems.

The equipment covered in this section is limited to the pump, priming, and drive components only. Refer to the applicable vendor's manual for motors, engines, and other accessory equipment. Use the troubleshooting section to help determine the cause of any problems. If the problem is persistent, contact your Pioneer Pump distributor for assistance.

SYMPTOM	POSSIBLE CAUSE (SEE TABLE BELOW)
No discharge	1, 2, 3, 4, 5, 7, 8, 9, 10, 17, 18, 19, 20, 37
Reduced capacity	2, 3, 4, 5, 7, 8, 9, 10, 11, 17, 19, 20, 21, 38, 39, 40, 47
Reduced pressure	5, 7, 8, 11, 13, 18, 19, 38, 39, 40, 47
No prime/loss of prime	2, 3, 4, 7, 10, 11, 20, 21, 22, 23, 49
Excessive power consumption, hot motor	6, 12, 13, 17, 18, 19, 24, 33, 34, 35, 36, 37, 38, 41, 42, 43, 44
Vibration and noise	2, 4, 9, 10, 14, 15, 17, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 39, 40, 41, 42, 43, 44, 48
Seal failure, short life, overheating	22, 23, 25, 33, 34, 35, 36, 41, 44, 45, 46
Bearings overheating	26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 41, 42, 43, 44
Pump overheats/seizes	1, 8, 9, 14, 33, 34, 35, 36, 41, 42, 43, 44
Corrosion, erosion, pitting, loss of material	7, 8, 11, 14, 15, 16

POSSIBLE CAUSE	EXPLANATION
1	Pump not primed
2	Suction line not filled
3	Air leak in suction line
4	Suction inlet blocked, insufficiently submerged, or too small
5	System head higher than pump design head
6	System head lower than pump design head
7	Insufficient NPSH
8	Parallel pump application incorrect
9	Suction pressure to vapor pressure below minimum
10	Suction lift too high
11	Excessive vapor in pumped liquid
12	Specific gravity of liquid different from design
13	Viscosity of liquid different from design
14	Operation at lower-than-rated capacity
15	Cavitation
16	Electrolysis
17	Impeller obstructed with foreign material
18	Wrong rotational direction
19	Low speed
20	Air leak into suction line
21	Air leak through mechanical seal
22	Seal fluid contaminated, hot, or insufficient
23	Seal fluid system not vented
24	High speed
25	Mechanical seal insufficient

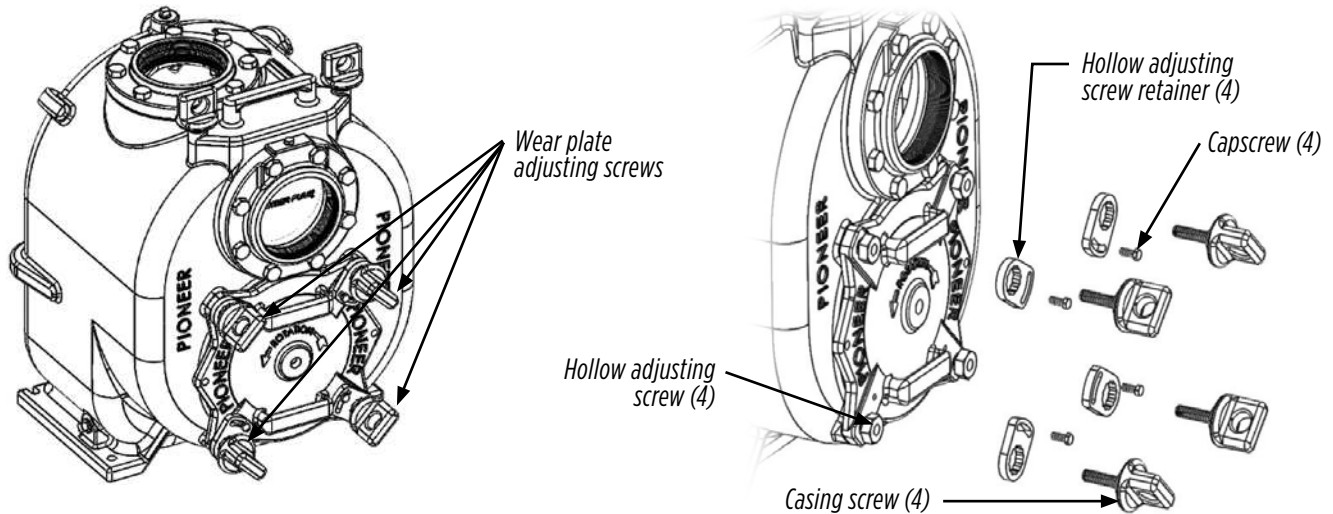
POSSIBLE CAUSE	EXPLANATION
26	Bearing housing excessively cooled
27	Low oil pressure (oil lube bearings)
28	Improper or poor lubrication
29	Lubrication defective
30	Contaminated oil or bearings
31	Moisture in lubricant or bearing housing
32	Excessive lubricant
33	Pipe strain
34	Temperature growth
35	Misalignment
36	Coupling improperly installed
37	Impeller installed backwards
38	Worn wear rings
39	Impeller damage
40	Impeller not balanced
41	Bent shaft
42	Excessive thrust
43	Rotational element dragging
44	Worn or incorrectly installed bearings
45	Mechanical seal incorrectly set, damaged, or hardened O-rings
46	Shaft scored at seal
47	Volute O-ring
48	Foundation not rigid or settled
49	Failed, open, or missing discharge check valve

GT SERIES WET PRIME PUMPS

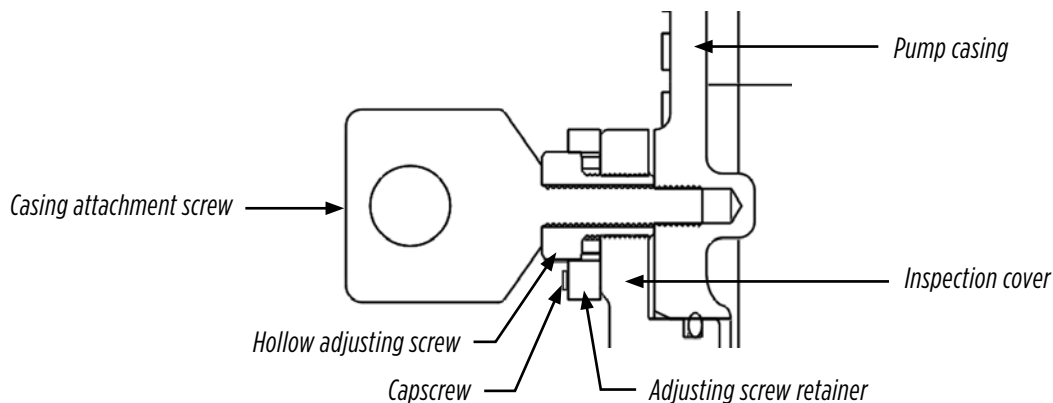
APPENDICES

Wear Plate Adjustment

The pump wear plate is easily and externally adjusted. A worn wear plate, or one out of adjustment, will result in slow or no priming and reduced pump efficiency. To adjust the wear plate, refer to the diagram and follow the described procedure. The wear plate is fixed to the inspection cover, so adjustment to the wear plate is accomplished by moving the inspection cover via adjusting screws.



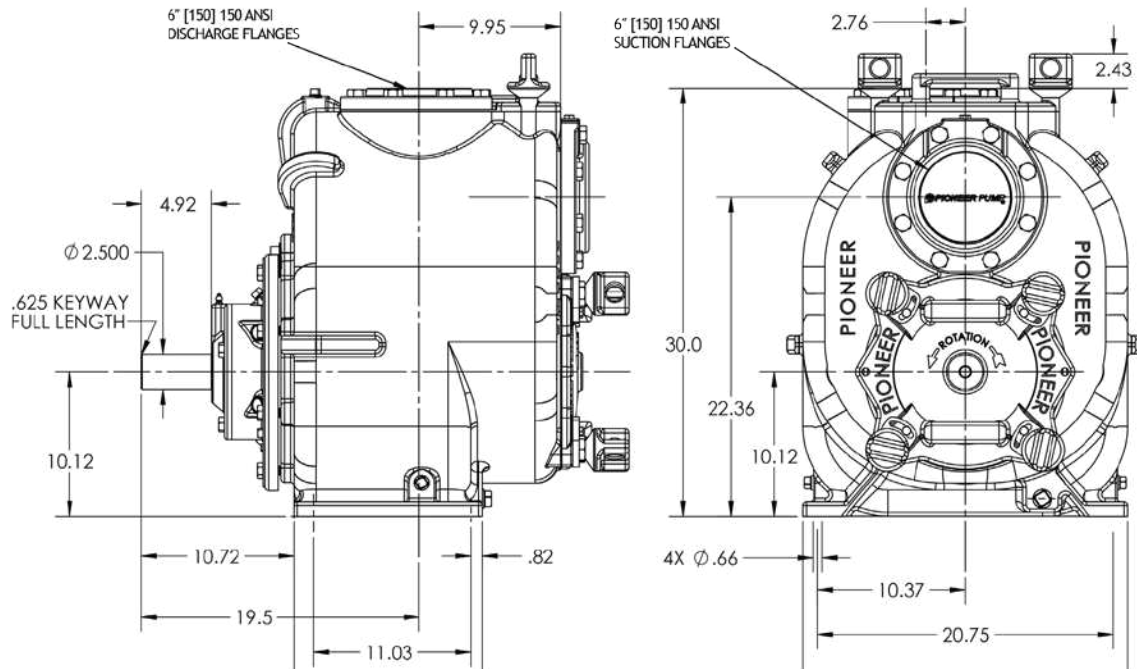
- Disconnect the driver from the pump so that the pump shaft can be turned by hand.
- Remove the capscrews securing the adjustment screw retainers and remove the adjustment screw retainers
- Loosen the casing attaching screws by one (1) to two (2) turns
- Loosen the hollow adjusting screws by 1-½ turns
- Tighten each of the casing screws until they just touch the top of the hollow adjusting screw.
- Continue to tighten each of the casing screws, one at a time, in ¼-turn increments while turning the pump shaft by hand until the shaft can no longer be turned by hand.
- Loosen the casing screws by two (2) turns.
- While attempting to turn the pump shaft by hand, tighten each of the hollow adjusting screws, one at a time by ¼-turn, until the shaft can be turned by hand and the impeller is not rubbing on the wear plate.
- Reattach the adjustment screw retainers using the capscrews to avoid moving the hollow adjusting screws.
- Tighten the case screws torqued to normal specifications for the thread size (5/8-UNC, Grade 5).



GT SERIES WET PRIME PUMPS

APPENDICES

Mechanical Dimensions



Performance Curve

